

The claims defining the invention are as follows:

1. A phase shifter element arranged to selectively vary the effective dielectric constant of a section of transmission line thereby changing the propagation
5 velocity of said transmission line and varying the phase of signals of desired frequencies or frequency range passing through said transmission line, said phase shifter element comprising a movable planar dielectric member of predetermined dielectric constant adjacent said transmission line, said planar dielectric member being provided with three or more discrete interactive dielectric
10 segments extending from at least one edge thereof to moveably overlap the adjacent transmission line, wherein optimum dimensions of each said interactive segment and optimum widths of gaps defined by opposite edges of adjacent segments are determined by computer optimisation means, such that the aggregate reflection of said signals passing through said transmission line is
15 minimised.
2. A phase shifter element as claimed in claim 1, wherein said gaps are air gaps.
3. A phase shifter element as claimed in claim 1, wherein said gap is at least partly filled by material whose dielectric constant is different to that of dielectric
20 constant of said dielectric segments.
4. A phase shifter element as claimed in claim 1, wherein said gap is at least partly filled by the same material as that of the dielectric segments, and wherein the thickness of the filling is less than the thickness of said segments.
5. A phase shifter element as claimed in any one of the preceding claims,
25 wherein said optimisation means comprises a radio frequency analysis and optimisation computer program to calculate data for controlling cutting equipment means to produce said dielectric segments having optimum dimensions and optimum widths there between.
6. A phase shifter element as claimed in any one of the preceding claims,
30 wherein said planar dielectric member comprises a rectangular body section, said dielectric segments extending from a major side thereof, and wherein the segments and the body section lie in the same plane.

7. A phase shifter element as claimed any one of the preceding claims, wherein said transmission line is operatively associated with an antenna array.
8. A phase shifter as claimed in claim 7, wherein said transmission line comprises a conductive track of predetermined electrical length supported on planar dielectric circuit board, said circuit board being mounted in a spaced relationship with a ground plane member.
9. A phase shifter as claimed in claim 8, wherein said movable dielectric member is interposed between said dielectric circuit board and said ground plane member.
10. A phase shifter as claimed in claim 8, wherein said movable dielectric member is disposed above said dielectric circuit board and remote from said ground plane member.
11. A phase shifter as claimed in any one of claims 8 to 10, including adjustment means for selectively moving said dielectric element in relation to said transmission line such that said segments and said gaps movably overlap said transmission line to vary the phase of signals passing through said transmission line.
12. A phase shifter as claimed in claim 11, wherein said adjustment means includes a remotely controllable servomechanism.
13. An antenna array incorporating a phase shifter as claimed in any one of the preceding claims.
14. An antenna array as claimed in claim 13, arranged as a multiple-band antenna array.
15. A phase shifter substantially as herein described with reference to Figures 1 to 7 of the accompanying drawings.

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ALCATEL